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A COST/RISK ANALYSIS OF FORCE STRUCTURES FOR THE CANADIAN SUPPORT GROUP

BY

Ivan W. Taylor, JSORT

DECEMBER 1998

OTTAWA, CANADA

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Ivan Taylor, JSORT

Recommended by: _____
Dr. R.R. Wheaton
JSORT

Approved by: _____
G. Lafond
DOR(J&L)

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ABSTRACT

J4 Logistics was directed by the Vice Chief of Defence Staff to determine the minimum establishment of Regular Force personnel for the Canadian Support Group (CSG). J4 Log tasked the Joint Staff Operational Research Team to conduct a Cost/Risk Analysis during these deliberations. A meeting was conducted on 20-21 October 1998 including J4 Logistics Doctrine and his staff, Commander of the General Support Group and the GS Cadre, and representatives from the Chief of Maritime Staff and 1 Canadian Air Division to analyze five proposed force structures for the CSG. The JSORT Cost/Risk Methodology was applied to the force structure options and the Cost/Risk Tradeoffs were quantified. Using the resulting graphical presentation, senior leadership can determine the Personnel savings that could result if greater levels of Risk were accepted. For example, the results suggest that if senior leadership could accept 20% Risk of Mission Failure in a Mid-Intensity Conflict the establishment could be reduced to 2500.

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A COST/RISK ANALYSIS OF FORCE STRUCTURES FOR THE CANADIAN SUPPORT GROUP

BACKGROUND

1. The Vice Chief of Defence Staff (VCDS) directed J4 Logistics to determine the minimum establishment of Regular Force Personnel to man the Canadian Support Group (CSG). J4 Logistics tasked the Joint Staff Operational Research Team (JSORT) to conduct a Cost/Risk Analysis of the Force Structure options being considered.

2. At a meeting, hosted by the Commander of the General Support Group in Kingston on 20-21 October 1998, the relative merits of five proposed Force Structure options were discussed. The participants included the Commander and the Cadre of the General Support Group, J4 Logistics Doctrine and his staff, and representatives for Chief of Maritime Staff and 1 Canadian Air Division.

2. The author developed a methodology that was applied during this meeting to collect data and compare the Costs and the Risks of the various Force Options. Using this methodology, it was possible to quantify the Cost reductions that might be expected and the Risks that would have to be accepted to reduce the size of the CSG.

THE ASSUMPTIONS

3. The assumptions to be used in the study were provided by the VCDS. A large part of the first day of the meeting was devoted to discussing these assumptions. Many of the assumptions relate to the potential employment of Reserves and Civilians in Operations. This could be part of a follow-on study. The primary result of the assumptions with regards to the following Cost/Risk analysis is the conclusion that the Force Structure must be built to respond to a Mid-Intensity Conflict under the maxim: "Structure for War, Adapt for Peace".

THE OPTIONS

4. Five Force Structure options were examined in detail.

5. **The Status Quo** has a nominal establishment of 2806 Personnel of which at present 10% are Reserves. The Structure of the establishment is along the lines of a standard Army formation with the Group divided into relatively independent battalions broken down into companies and platoons. The main battalions provide Transportation, Supply and Maintenance as separate functions.

6. **Maximum Tactical Level** was the name for the option that would return the logistics organization to its pre-CSG establishment. Most of the services would to devolved to the environments with only a small central CSG handling Movement and Control. This was considered but later discarded because further analysis indicated that it would actually increase the number of Regular Force personnel assigned to Support functions.

7. **The Theatre Log Unit** option would centralize logistic support for an entire theatre in one place. This could result in savings of personnel in self-administration but not without problems in flexibility.

8. **The Reduced C2** option would concentrate on savings for senior C2 staff. The structure would remain much the same with its independent battalions. However, the separate headquarters functions would be rationalized with potential savings of some 125 personnel or more.

9. Finally, **the Static CSG** option would organize support along the lines of a mini-Canadian Forces Base. There would be considerable savings in self-administration but there would be problems with mobility that could make it unacceptably Risky in a Mid-Intensity conflict.

PRINCIPLES OF ADMINISTRATION

10. When considering the relative Merits of the various Force Structures, it was agreed that the Principles of Administration would be an excellent framework for the analysis.

11. **Foresight** involves the ability of the organization to plan and execute plans. The coordination of First Line, Second Line and Third Line information is central to this principle.

12. **Economy** relates to the ability of the organization to exercise efficient procedures during operations. It is not directly related to the size of the organization.

13. **Flexibility** relates to the organization's adaptability to changing demands.

14. **Simplicity** works in a logistics organization, complexity is doomed to failure.

15. **Cooperation** considers all the connections from the outside the organization (Canadian and other nations, military and civilian) and within the organization itself.

16. **Self-sufficiency** is determined based on the amount of external support required to sustain this organization.

COMPARISON OF THE OPTIONS

17. The afternoon of the second day of the meeting was spent evaluating the relative Merits of the five options.

18. It was decided to evaluate the options for each of the Principles of Logistics based on a 4-point scale with 3 representing High, 2 representing Medium, 1 representing Low and 0 representing Unacceptable. An option with an Unacceptable rating would be discarded.

19. Table I shows the results of the deliberations. J4 Log Doc recorded the justifications for these ratings. These ratings can be examined in the minutes of the meeting of the CSG Working Group on 20-21 October 98 in Kingston, Ontario.

TABLE I

RELATIVE MERITS OF FORCE STRUCTURE OPTIONS

Options	Foresight	Economy	Flexibility	Simplicity	Cooperation	Self Sufficiency
Status Quo	3	2	3	3	3	3
Max Tactical	3	3	3	3	3	3
Theatre Log			0			
Reduced C2	3	2	3	3	3	2
Static CSG			0		0	

20. One can see that the Theatre Log Unit was discarded from further consideration because it was not considered sufficiently flexible for a Mid-Intensity conflict. Similarly, the Static CSG option of Flexibility Unacceptability and Cooperation Unacceptability was discarded. This left only three options remaining at this point in the analysis.

21. The relative weighting of the criteria was discussed and it was decided that equal weights were appropriate because logistical success depends on all of these principles being adopted.

22. Figure 1 shows the results of this analysis graphically.

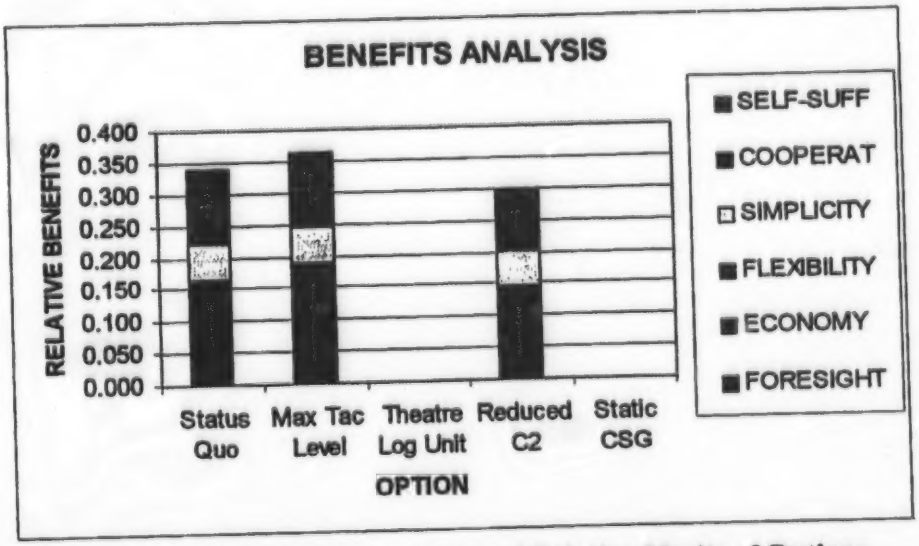

Figure 1: Graphical Presentation of Relative Merits of Options

COST ANALYSIS

23. The costs associated with personnel, training, readiness, and equipment were discussed. It was quickly realized that all these costs are directly related to the number of personnel in the establishment. So personnel was used as the primary measure of cost.

24. Table II shows the estimates for the number of personnel in the establishment of each of the three options remaining in the analysis. The determination of these numbers was highly subjective. For example, the Maximum Tactical Level was assumed to require 5% more personnel than the Status Quo. The Reduced C2 option was assumed to require 10% less personnel than the Status Quo. These estimates would obviously have to be verified.

TABLE II
ESTIMATED PERSONNEL ESTABLISHMENTS

Option	Personnel Establishment
Status Quo	2806
Maximum Tactical Level	2946
Reduced C2	2525

25. Since the Maximum Tactical Level option actually requires more personnel than the Status Quo, it was removed from further consideration.

COST/BENEFIT ANALYSIS

26. Figure 2 shows a graph that summarizes the results of the Cost/Benefit analysis for the two remaining options.

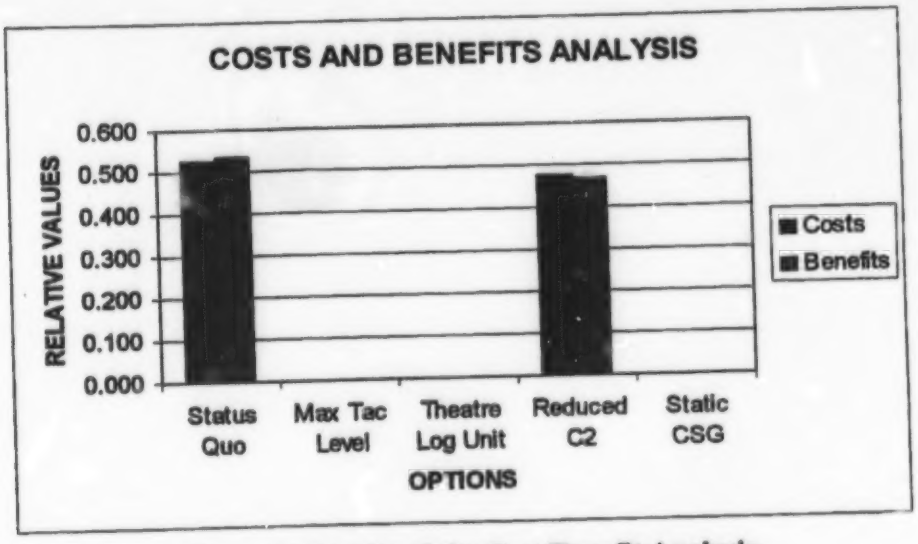

Figure 2: Results of the Cost/Benefit Analysis

27. It can be seen from this graph that the Status Quo has higher costs and higher benefits than the Reduced C2 option. This is consistent with most Cost/Benefit analysis: "You get what you pay for".

28. A valuable method of comparing the relative gains and losses is to consider the percent savings in cost compared to the percent loss in benefits. In this case, the savings involved in going from the Status Quo to the Reduced C2 option are 10% while the loss in relative benefits is 12%. This kind of result is typical of Cost/Benefit analysis, namely, the benefits fall faster than the costs. Why that is will be explained in the Cost/Risk Analysis.

COST/RISK ANALYSIS

29. As mentioned in the assumptions, one should structure for War and adapt to Peace. In this case, consider the requirement for a CSG in a Mid-Intensity conflict. The Status Quo option was developed for this contingency. If we assume that the Status Quo option would have a 99% confidence of success in a Mid-Intensity conflict, then a 12% loss in capability in the Reduced C2 option would result in approximately 87% confidence of success in the same conflict. This may be acceptable Risk to bear considering the potential savings. Alternatively, one might ask what about the potential savings that might be available if more Risk was accepted. Figure 3 shows an extrapolation of these Cost/Risk observations.

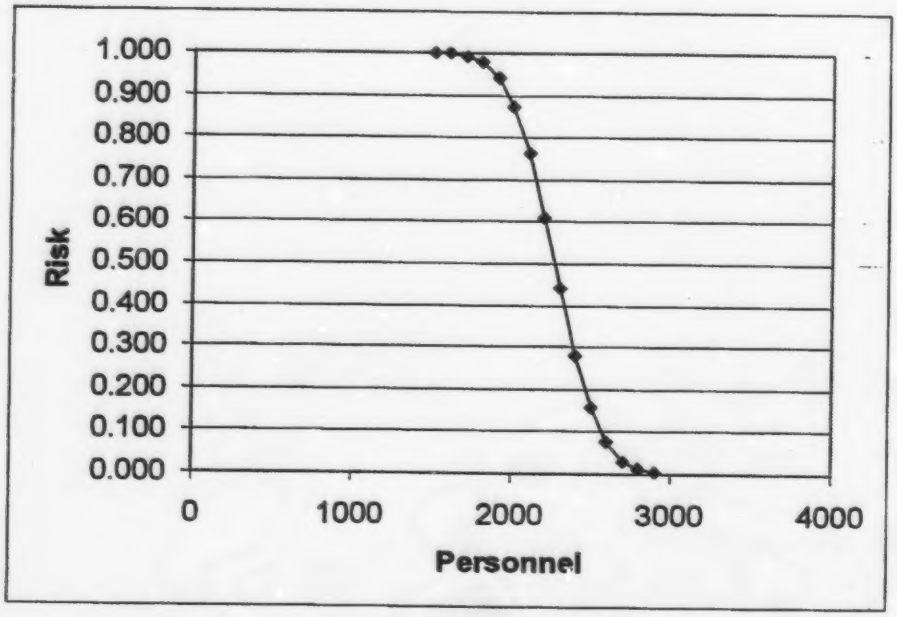

Figure 3: Cost/Risk Tradeoffs

30. It can be seen from this curve that to have any chance of success in a Mid-Intensity conflict at least 2000 personnel are required. With 3000 personnel, success of the CSG is almost certain. If one was willing to accept 20% Risk of Mission Failure in a Mid-Intensity Conflict, it should be possible to reduce the size of the CSG to 2500 personnel. It was agreed that anything more than 20% Risk acceptance would probably be based on political factors rather than military considerations.

CONCLUDING REMARKS

31. The meeting was concluded with the agreement that a considerable amount of progress had been made on the study. The Force Structure issue had been thoroughly examined and the detailed analysis to arrive at a minimum establishment for the CSG had been generated. The conclusion was that the CSG establishment can be reduced but not without a loss in capability and an acceptance of increased Risk if called on in a Mid-Intensity conflict. The minimum recommended establishment was suggested to be 2500 personnel if 20% Risk of Mission Failure is acceptable. The question remains to consider the employment of Reserves and Civilians to reduce the number of Regular Military personnel required. The Cost/Risk methodology could be applied in this further study in a similar manner.

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